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## Prenatal care utilization in Zimbabwe: Examining the role of community-level factors

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### ABSTRACT

This paper assesses the importance of community-level factors on prenatal care utilization in Zimbabwe. The analysis is performed using data from the two most recent rounds of the nationally representative Demographic and Health Survey for Zimbabwe conducted in 2005/06 and 2010/11 linked with other community-level data. We use logistic, generalized linear regressions as well as multilevel mixed models to examine the factors associated with the frequency, timing and quality of prenatal care. Our results suggest that contraceptive prevalence, religious composition, density of nurses, health expenditures per capita and availability of government hospitals in communities are important predictors of prenatal care use in Zimbabwe. These findings have important implications for public health policy in Zimbabwe – a country with unfavorable maternal and child health outcomes.

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### 1. Introduction

Despite notable improvements in prenatal care use over the past two decades [1], poor maternal and child health outcomes continue to be serious challenges in Sub-Saharan Africa (SSA). For instance, while the proportion of pregnant women receiving prenatal care from a skilled health professional rose from 69% in 2006 to 77% in 2013, maternal mortality remained high around 520 deaths per 100,000 live births representing more than 50% of the reported global maternal deaths [2]. Important progress has also been made regarding infant and under-five mortality. For instance, though still unacceptably high, the infant (under-five) mortality rate dropped from 108 (180) deaths per 1000 live births in 1990 to 56 (83) deaths per 1000 live births in 2015 respectively [3].

Numerous studies have linked timely, adequate and high-quality prenatal care use to better maternal and newborn health outcomes [4–7]. Adequate and timely sought prenatal care offers numerous benefits to pregnant women from early detection of complications to nutritional intake advice, behavioral education and preparation for motherhood [8,9]. Most developing countries in Asia and SSA including Zimbabwe follow the four-visit model

as recommended by the World Health Organization (WHO) for women with less complicated pregnancies and living in low-income regions [9].

Empirical research on the determinants of prenatal care in SSA and Asia is vast and rapidly growing. This research has established that individual and sociodemographic factors are important predictors of prenatal care use. These factors include but not limited to maternal education, cultural or religious beliefs, maternal employment status, location, and pregnancy desire (i.e. whether the woman wanted the pregnancy at the time she got pregnant) [10–13]. However, little is known about the contribution or influence of community-level factors on the use of antenatal care services in countries with poor maternal and child outcomes such as Zimbabwe.

Building on the above literature, the primary objective of this study is to examine the overall importance of the community-level factors such as religious composition, contraceptive prevalence, density of nurses, hospitals, and health expenditures at the cluster-level on the timing of care, frequency of visits and quality of received prenatal care. Religious beliefs at the community-level are believed to play an essential role in shaping women's attitudes and behavior towards the use of maternal care services [14,15]. Social ties within communities also help influence contraceptive utilization rates [14]. Thus, an understanding of the contribution of community-level factors is imperative for public policy in the design of relevant public health policies. The focus on community factors is prompted by the fact that individuals constitute the

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community, their behavior and beliefs are in turn shaped by the same communities in which they reside [16].

The analysis uses two rounds of the nationally representative Zimbabwe Demographic and Health Survey (ZDHS) to test the influence of community-level factors on the utilization of antenatal care services in Zimbabwe. Zimbabwe is a particularly interesting case to consider for two reasons. First, high prenatal care utilization rates continue to co-exist with unfavorable pregnancy outcomes like high under-five mortality rates [17]. According to the ZDHS, approximately 92% of pregnant women received some form of prenatal care between 2000 and 2011, and yet the average maternal mortality rate stood at 960 deaths per 100,000 live births over the same period. Furthermore, recent official statistics on child mortality reveal that the infant (under-five) mortality increased from 53(77) deaths per 1000 live births in 1990–1994 to 57(84) deaths per 1000 live births in 2010–2011 [18].

Second, a cursory examination of the data reveals that most pregnant women still initiate prenatal care well after the first three months and have inadequate and low quality prenatal care. The ability to provide quality prenatal care services in the country is often lacking due to serious deficiencies in skilled health providers, senior medical staff, functioning laboratory equipment, financial resources for health care delivery, and the availability of necessary health drugs [19]. Thus, even when pregnant women overcome all the constraints associated with the physical access to prenatal care services, they may still face yet other obstacles related to the quality of the services provided. In this context, cluster-level or community-level factors potentially become essential components of the use of prenatal care services.

## 2. Methods

### 2.1. Data source

The empirical analysis uses data from two rounds of the nationally representative Zimbabwe Demographic and Health Survey (ZDHS) conducted in 2005/06 and 2010/11. The ZDHS collects detailed health information for women of reproductive ages 15–49 and their children. The survey used a stratified two-stage cluster sample design based on the Zimbabwe population census of 2002. The first stage involved a random sampling of the enumeration areas followed by a random sampling of households (excluding individuals living in institutional facilities such as army barracks, hospitals, police camps, and boarding schools) at the second stage.

Of the 9870 eligible women in the 2005/06 ZDHS, 8907 were successfully interviewed, yielding a response rate of 90% [20]. Among the 9831 eligible women in the 2010/11, 9171 were successfully interviewed, resulting in a response rate of about 93% [18]. The analysis in this study uses the individual woman data file, which contains both parental and household characteristics including detailed prenatal care information for the most recent birth that occurred within the five years before each survey. We supplemented the ZDHS data with health facilities data obtained from the Zimbabwe Statistical Agency (ZIMSTAT) and other country specific reports on health resources.

Since we used a pooled cross-sectional sample, we adjusted the survey weights such that the initial sampling probabilities were preserved in either survey. Then, we re-scaled the sampling weights such that each survey received an equal weight and making the simplifying assumption that the overall population in Zimbabwe did not significantly change to the extent of altering our study conclusions. The final sample weights consist of the original ZDHS weights adjusted to reflect the consequence of pooling across multiple waves. All our estimates especially summary statistics are weighted to be nationally representative.

### 2.2. Measures of prenatal care

This study considers three outcome variables to measure the frequency, timing and quality of prenatal care. We use the responses to different questions on prenatal care asked during each survey. Each respondent in the ZDHS, who had given birth five years preceding each survey, was asked to provide information regarding her most recent pregnancy. Follow-up questions were asked on who had provided the care, how many visits they had completed and the specific services they had received during each prenatal care visit.

#### 2.2.1. Formal antenatal care use

All the women were first asked a general question regarding the receipt of any prenatal care. Each respondent was asked: “Did you see anyone for prenatal care for this pregnancy?” If yes, each respondent was asked to state whether they had seen a doctor, nurse or midwife, auxiliary midwife, traditional birth attendant, community village health worker or any other person. We use the response to this question to create a binary variable equals 1 if the respondent received some form of prenatal care during pregnancy and 0 otherwise.

#### 2.2.2. Timing of prenatal care

For the subsample of women who sought prenatal care, another follow-up question regarding the timing of care was asked. “How many months pregnant were you when you first received prenatal care for this pregnancy?” Possible responses ranged from 0 to 9 months with 0 being the earliest and 9 the late prenatal care initiators. Globally, prenatal care initiated in the first trimester is the highly recommended option for all pregnant women [9,21]. We created a binary indicator equals 1 if prenatal care was initiated in the first trimester (three months of pregnancy) and 0 otherwise.

#### 2.2.3. Frequency of prenatal care

Respondents who had gone for prenatal care were further asked another question regarding the number of visits they had completed. More specifically, each respondent was asked this question: “How many times did you receive prenatal care for this pregnancy?” The responses ranged from 0 visits to a maximum of 20 visits. We used the response to this question as our measure for the frequency of antenatal care services.

#### 2.2.4. Quality of antenatal care use

Lastly, the subsample of prenatal care users was further asked a series of questions about the specific services they had received during each prenatal care visit. “As part of your prenatal care during this pregnancy, were any of the following services done at least once: (1) was your blood pressure measured? (2) Did you give a urine sample? (3) Did you give a blood sample? (4) during any of your prenatal care visit(s) were you told about things to look out for that might suggest problems with the pregnancy?, (5) during this pregnancy were you given an injection in the arm to prevent the baby from getting tetanus or convulsions after birth?, (6) during this pregnancy, were you given or did you buy any iron tablets or syrup?, (7) during this pregnancy, did you take any drugs to keep you from getting malaria?. Each response was coded as 1 if a specific service was received and 0 otherwise. Following Deb and Sosa-Rubi [22] we then created an index to measure the quality of prenatal care by adding all the “yes” responses for each woman.

### 2.3. Explanatory variables

The decision to utilize prenatal care services is thought to depend on a set of individual characteristics, household

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